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Before the
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Washington, DC 20554

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of)	
)	
The Development of Operational,)	
Technical, and Spectrum Requirements)	WT Docket No. 96-86
for Meeting Federal, State and Local)	
Public Safety Agency Communication)	
Requirements Through the Year 2010)	
)	
Establishment of Rules and Requirements)	
For Priority Access Service)	

COMMENTS OF MOTOROLA TO THE SECOND NPRM

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COMMENTS OF MOTOROLA TO THE SECOND NPRM

Motorola, Inc. ("Motorola") hereby submits its comments in response to the Commission's Second Notice of Proposed Rulemaking in the above-captioned docket ("*Second NPRM*"). As discussed below, the FCC should expeditiously complete the allocation of 24 MHz in the 746-806 MHz band. To assist in this effort, Motorola provides below its recommendations for operation in the new band, including: (i) allocation of 10 mutual aid channels, similar to the NPSPAC channels in the existing 800 MHz public safety bands; (ii) implementation of flexible rules for interoperability channels that achieve a cooperative partnership with regional planning committees; (iii) enactment of service rules providing for a broad variety of spectrally efficient technologies; (iv) adoption of television protection criteria that maximize public safety use of the 746-806 MHz band; and, (v) support for measures designed to enhance the ability of commercial mobile radio service providers to meet public safety users needs through priority access offerings. Moreover, while Motorola supports PSWAC's suggestions for a baseline interoperability mode for analog voice services, it is premature and would be counterproductive

to mandate technical standards for digital voice, trunking, and advanced services. Motorola urges the FCC to act consistent with these recommendations and rapidly move forward with licensing of public safety channels in the 746-806 MHz band in order to meet the needs of public safety users as well as Congressional direction.

I. INTRODUCTION AND SUMMARY

This proceeding is the next logical step of a long process undertaken to ensure that sufficient wireless communications resources continue to be available for the safe and effective discharge of public safety agencies' joint duty to protect life and property. Following up on the recommendations of the Public Safety Wireless Advisory Committee ("PSWAC"), legislative mandates, and the record developed in the prior inquiry on meeting long term public safety needs, the *Second NPRM* proposes to allocate 24 MHz in the 746-806 MHz band for public safety users. The *Second NPRM* therefore seeks comment on developing rules and policies for the use of the newly allocated channels, interim sharing criteria for protecting television operations, and, in a related matter, on facilitating public safety use of commercial systems by developing priority access mechanisms.

Motorola strongly supports the expeditious allocation of spectrum -- and the related development of channel usage rules and policies -- in the 746-806 MHz band for public safety users. As documented in the record in this proceeding and in the comprehensive *PSWAC Report*, the lack of sufficient communications capacity has already impaired the ability of public safety users to discharge their health and safety obligations, endangering not only the lives of public safety officers, but also the lives and property of those they protect and serve. Under these circumstances, it is absolutely vital that the Commission act swiftly to make available new spectrum for public safety users, as proposed in the *Second NPRM*.

Given the need to act rapidly in this proceeding to alleviate critical deficiencies in public safety communications, the FCC should rely heavily on the *PSWAC Report* to answer the sweeping long term questions posed in the *Second NPRM* on future development of public safety radio systems. The *Second NPRM* proposes a broad review of numerous implementation issues for future public safety development, many of which were fully briefed in the *PSWAC Report* and in prior FCC proceedings. To ensure that a reexamination of these issues does not delay licensing new public safety channels in the 746-806 MHz band beyond the rapidly approaching Congressional deadline, Motorola urges the FCC to look to the extensive record that has already been developed on the future of public safety systems.

To achieve Congress' goal of rapidly beginning licensing of new public safety channels in the 746-806 MHz band, Motorola proposes below a number of technical and policy measures to facilitate rapid access to that band. First, with regard to interoperability, Motorola proposes that the Commission adopt a flexible, cooperative approach consistent with the PSWAC recommendations. Specifically, Motorola believes the Commission should continue to encourage regional coordinators and public safety users to identify interoperability channels in each band where public safety agencies operate, because long term interoperability needs simply cannot be addressed in a single band through a "one size fits all" solution. PSWAC adopted this approach by recommending that 2.5 MHz of spectrum for interoperability be allocated in the VHF and UHF bands between 138 MHz and 512 MHz. Accordingly, the FCC should not attempt to satisfy PSWAC's recommendation for interoperability solely with the 746-806 MHz band. Instead, the Commission should allocate a reasonable number—*e.g.*, 10—of additional mutual aid channels on a national basis to be used in conjunction with the 800 MHz NPSPAC

channels, and allow regional coordinators the flexibility to designate other channels in the 746-806 MHz band (and in existing bands) for other interoperability needs.

Motorola also believes that the Commission should adopt PSWAC's suggestion to mandate the 16K0F3E emissions designator, and the 11K25F3E, as appropriate, as a baseline technology for analog voice interoperability channels. The Commission should not, however, attempt to mandate a particular digital voice interoperability mode, nor should it attempt to set standards for trunking, packet data, high speed broadband data, or video. Instead, Motorola urges the Commission to allow the public safety community to develop such standards through user-driven standards processes, as PSWAC recommended. Codifying standards for evolving technologies in the Commission's rules will only delay the development of spectrum efficient equipment for public safety users and limit the future flexibility to innovate.

Motorola also urges the Commission to adopt service rules for the 746-806 MHz band that provide public safety agencies with sufficient flexibility and recognize the valuable role of regional coordinators in identifying and addressing public safety needs. Specifically, Motorola supports the use of regional planning committees, which have worked well for the NPSPAC channels in the 821-824/866-869 MHz band. These committees should be given expansive authority to determine the eligibility of particular users based on their understanding of the needs of the local public safety community.

Motorola offers numerous recommendations for channelization and minimum technical standards for public safety use of the 746-806 MHz band. The intent is to provide a technology neutral framework that provides users the ability to aggregate bandwidth for purposes of using a variety of differing technologies. These recommendations are consistent with the document previously submitted to the Commission and referenced in the *Second NPRM*. Also, as

recognized in the *Second NPRM*, the adoption of reasonable land mobile/television sharing criteria is critical to the efficient use of 746-806 MHz channels by public safety users. In this regard, Motorola urges the Commission to adopt sharing criteria that reflects the propagation differences between the 470-512 MHz and the 746-806 MHz bands. Motorola also supports the use of a 40 dB protection ratio for television stations as proposed in the *Second NPRM*. Utilizing these recommendations will allow the Commission to protect adequately existing television stations and facilitate the introduction of public safety systems in the band.

Finally, Motorola urges the Commission to ensure that Commercial Mobile Radio Service ("CMRS") providers are not subject to liability for structuring priority access offerings for public safety. While CMRS systems are not a substitute for stand-alone public safety networks, they may serve a significant role for certain types of traffic and their use should be encouraged. Bearing this in mind, Motorola urges the Commission to address priority access, but not at the expense of expeditious action on the allocation of spectrum and establishment of technical service rules for the 746-806 MHz band.

II. THE FCC SHOULD ADOPT A FLEXIBLE, COOPERATIVE APPROACH CONSISTENT WITH PSWAC'S RECOMMENDATIONS TO MEET THE LONG TERM INTEROPERABILITY NEEDS OF PUBLIC SAFETY AGENCIES

As stated in the *PSWAC Report*, "[i]nteroperability between and among wireless communications systems used by federal, state, and local Public Safety agencies is generally accepted to be . . . essential for the protection of life and property."¹ Motorola thus agrees with the Commission that the "present inability of public safety agencies to communicate with each

¹ PSWAC, Final Report of the Public Safety Wireless Advisory Committee to the Federal Communications Commission and National Telecommunications and Information Administration, Sept. 11, 1996 ("*PSWAC Report*") at 44.

other is one of the most critical deficiencies in today's public safety communications.”² As discussed below, overcoming the obstacles to interoperability identified by PSWAC will require a flexible, coordinated effort by the FCC, public safety users, regional coordinators, and manufacturers. The complexity of public safety users' interoperability needs simply does not allow a “one size fits all” approach to resolving intercommunications among federal, state, and local public safety agencies. Motorola has therefore outlined below a cooperative strategy for achieving practical interoperability in both the short and long term.

A. The Complex Obstacles to Long Term Interoperability Must Be Addressed Through Cooperative Planning and Flexible Regulatory Policies

The *Second NPRM* advances a number of proposals and preliminary conclusions to achieve the FCC's goal of ensuring that “[e]very public safety officer [has] . . . access to a communications system that is reliable, of high quality, and allows him or her to communicate with colleagues in other jurisdictions or from other agencies during emergencies as well as on a day-to-day basis.”³ Among other things:

- The *Second NPRM* proposes to “dedicate a significant amount of spectrum in the 746-806 MHz band solely for interoperability communications.”⁴
- The *Second NPRM* proposes to “categorize public safety communications into four separate types: voice, data, image/high speed data (image/HSD), and video [for purposes of interoperability],”⁵ “make spectrum available for these four general types of communication,” and asks “whether and how each of these types of potential

² *Second NPRM* at ¶27.

³ *Id.* at ¶3.

⁴ *Id.* at ¶44.

⁵ *Id.* at ¶46.

interoperability communications could or should be accommodated in our designation of interoperability spectrum.”⁶

- The *Second NPRM* seeks comment on whether to specify “analog or digital modulation for voice interoperability channels,” including “whether standards on these channels . . . should be adopted.”⁷ The *Second NPRM* also seeks comment on “how long it would take to develop digital standards” and “whether adopting a digital standard would result in all interoperability equipment being tied to *today’s* digital technology.”⁸ Similar questions are also posed regarding data, image/HSD, and video interoperability channels.⁹
- The *Second NPRM* seeks comment on technical requirements for interoperability channels, including “what channel spacing should be adopted for voice, data, image/HSD, and video interoperability channels.”¹⁰
- Finally, the *Second NPRM* seeks comment on “whether we should provide for a combination of one-way (mobile transmit-only) and two-way (base transmit and mobile transmit) voice channel pairs,” and the numbers of channels to be dedicated for each mode of operation.¹¹

As discussed below, given the varied needs of public safety agencies, the questions must be addressed through a broad and flexible menu of interoperability solutions to provide practical, real-world support for public safety users.

The PSWAC, the FCC, and public safety users have all recognized that agencies have vastly varied interoperability needs. These needs include “three different types of interoperability missions in Public Safety communications – day-to-day, mutual aid, and task

⁶ *Id.* at ¶51.

⁷ *Id.* at ¶56.

⁸ *Id.* at ¶56 (emphasis in original).

⁹ *Id.* at ¶¶57-60.

¹⁰ *Id.* at ¶66.

¹¹ *Id.* at ¶68.

force.”¹² Each of these categories of interoperability communications is associated with, among other things, different capacity needs, varying abilities to pre-plan channel usage, distinct jurisdictional participants, diverse equipment compatibility requirements, different mixes of tactical and command parameters, and other factors. Further complicating matters, PSWAC identified as one of the principal obstacles to achieving interoperability the fact that “Public Safety agencies, federal, state, and local, use a total of ten radio bands that range from a low of 30 MHz to over 800 MHz.”¹³

Given the complexities of achieving interoperability among public safety agencies, it is apparent that no “one size fits all” national interoperability plan can be adopted. Rather, enhancing interoperability among public safety users is a complex task that will require a joint effort by the FCC, public safety users, regional coordinators, and manufacturers. Motorola believes the FCC should ensure sufficient spectrum remains available for both communications and interoperability, allow flexible use of such spectrum, and encourage the harmonization and standardization efforts of public safety users. Public Safety users and regional coordinators must work together to use the flexibility inherent in new spectrum to expeditiously develop use plans meeting local conditions; address future common communications modes for digital operation; and develop “an adequate nationwide mutual aid plan and incident command system.”¹⁴ Manufacturers, for their part, must provide spectrum efficient products responsive both to the

¹² *PSWAC Report* at 46; *Second NPRM* at ¶33.

¹³ *PSWAC Report* at 47.

¹⁴ *Id.* at 48.

short and long term needs of public safety users. Only through such a cooperative effort can the significant obstacles to the fullest and most practical interoperability be achieved.

B. The Policies Adopted for the 746-806 MHz Band Should Foster Long Term Solutions to Public Safety Users' Interoperability Requirements

Consistent with a flexible regulatory approach and the recommendations of PSWAC, Motorola believes that interoperability channels must be allocated not only at 746-806 MHz, but also in other existing public safety communications bands. This solution, in fact, was the first suggestion by PSWAC and, as the FCC notes, was supported by commenters analyzing the *PSWAC Report*.¹⁵ Because, as PSWAC found, “[n]o single, commercial grade radio is capable of operating in all of the bands utilized by different agencies,”¹⁶ a long term solution to interoperability compels the need to identify interoperability channels in each band used by public safety agencies. Recognizing that the existing public safety bands are heavily congested, however, Motorola believes efforts to free channels for interoperability in spectrum below 512 MHz should be left as a longer term goal for regional coordinators. By allocating new public safety spectrum in the 746-806 MHz band, the FCC’s actions may alleviate some of the worst congestion in the lower public safety bands, making the task of freeing up interoperability channels in existing spectrum feasible.

¹⁵ *PSWAC Report*, Appendix C at 63; see also *Second NPRM* at ¶42 (citing comments of Ohio-DAS urging the FCC “to identify specific channels in each of the public safety bands for interoperability”).

¹⁶ *PSWAC Report* at 47.

Specifically with respect to the 746-806 MHz band, Motorola suggests minimal regulations differentiating between mutual aid and other forms of interoperability spectrum. In particular, Motorola believes that the Commission should allocate ten mutual aid voice channels and allow regional public safety coordinators the flexibility to implement the PSWAC recommendations regarding day-to-day and task force interoperability channels, which lend themselves more to pre-planning efforts. As PSWAC noted, however, mutual aid “involv[es] interoperability among multiple agencies under conditions that allow little opportunity for prior planning for the specific event—*e.g.*, riots or wildland fires.”¹⁷ Under these conditions, specific FCC-defined mutual aid channels would promote interoperability and consistency of use on a regional and national basis.

Indeed, due to the proximity of the new 746-806 MHz band to the existing 806-824/851-869 MHz public safety allocations, the interoperability policies adopted for the newly allocated spectrum can significantly enhance public safety interoperability. Motorola believes the NPSPAC mutual aid channels designated in the 806-824/851-869 MHz band should be, in effect, extended and expanded by designating additional mutual aid channels in the 746-806 MHz band. In particular, Motorola urges the FCC to require installation of the existing mutual aid channels in all 746-806 MHz radios and to adopt similar open licensing policies for the new 746-806 MHz mutual aid channels, including allowing use of such channels by federal agencies. Consistent with Motorola’s recommendations below, minimum baseline technical standards for unit-to-unit interoperability should also be specified.

¹⁷ *Id.*

While voice continues to be the “staple” communications of public safety for mutual aid, as both the FCC and PSWAC recognize, data communications are becoming integrated into many agencies’ operating needs. As the FCC correctly observes, however, substantial standardization work must be completed before data interoperability becomes a reality.¹⁸ To address data communications needs while facilitating the development of standards, Motorola believes that a portion of the public safety allocation should be designated for nationwide data interoperability needs. Perhaps as much as 2 megahertz in total should be reserved for this use. The public safety community should be provided a reasonable period, perhaps two years, to demonstrate substantial progress on standards for data interchange on this spectrum or have the spectrum returned to the general pool of voice/data channels. In this manner, if a sufficient consensus is achieved that data interoperability is feasible and needed, spectrum will be available.

C. The Commission Should Adopt PSWAC’s Suggestion To Establish Minimum Baseline Standards for Unit-To-Unit Radio Equipment Designed To Operate In the Same Band

One of the principal obstacles to interoperability identified by PSWAC, and the FCC, is “the lack of common communications modes among different types of systems.”¹⁹ Specifically, PSWAC noted that “even if the [radio] units [utilized by public safety users] from different systems operate in the same band, they may not be able to communicate because they use different transmission or signaling techniques.”²⁰ The PSWAC ISC also stated:

¹⁸ *Second NPRM* at ¶56.

¹⁹ *PSWAC Report* at 47; *Second NPRM* at ¶55.

²⁰ *PSWAC Report* at 48.

[M]ost often there is neither time nor opportunity to set up gateways between channels and systems at emergency events. In addition, infrastructure coverage cannot be provided across the entire country and a great reliance must remain on unit-to-unit tactical communications. We must make sure that any radios arriving on an incident have at least a baseline technology capability to talk directly to any other unit on the same frequency band on the scene.²¹

As a result, PSWAC ultimately concluded that:

[T]he minimum baseline technology for interoperability, for unit-to-unit voice communication, be 16K0F3E (analog FM), unless FCC and/or NTIA regulations stipulate a different emission in a specific operational band. . . . Effective January 1, 2005, the minimum baseline technology for interoperability, for unit-to-unit voice communication should be mandated as 11K25F3E (analog FM) in Public Safety spectrum between 30 MHz and 512 MHz, unless FCC and/or NTIA regulations stipulate a different emission in a specific operational band.²²

Under the circumstances, Motorola supports PSWAC's recommendations to establish 25 kHz (and, later, 12.5 kHz) analog FM as a common mode of operation for voice interoperability channels.

As the *Second NPRM* recognizes, FCC-based digital regulatory mandates extending beyond analog FM as an baseline technology implicate significant regulatory issues. First, specification of a digital baseline technology in the rules requires "use of a common voice coder, digital modulation scheme, *etc.*,"²³ and thus involves more comprehensive and complex regulations. Second, the FCC indicates that "[d]eveloping and implementing digital standards

²¹ *Id.*, Appendix C at 55.

²² *Id.* at 51.

²³ *Second NPRM* at 55.

may be a difficult task,”²⁴ and asks whether “the time associated with the development process offsets the advantages of digital technology.”²⁵ Finally, as the Commission notes, “adopting a digital standard would result in all interoperability equipment being tied to *today’s* digital technology for many years, even if that technology experiences great advances in the next century.”²⁶

Precisely for these reasons, Motorola believes the FCC should resist mandating technical standards for digital systems. While Project 25, TETRA, and other radio systems offer legitimate solutions, and were developed through accredited standards setting processes, enshrining those types of digital mandates in the FCC’s rules would severely limit future flexibility. Due to the administrative process requirements inherent in FCC rule setting procedures, such standards would be slow to react to the changing needs of the user community. In addition, such standards would not be subject to the same peer review process used by standards organizations, such as TIA and IEEE. Under the circumstances, Motorola believes the public safety user community is capable of specifying through industry standards organizations the requirements necessary for future digital voice interoperability.

Motorola also believes it is premature to specify any baseline standards for non-voice systems, whether data or video. While the FCC should encourage further work on defining baseline interoperability for these communications modes and ensure that these evolving standards are adequately supported by equipment manufacturers, it is too early to impose

²⁴ *Id.*

²⁵ *Id.* at 56.

²⁶ *Id.* (emphasis in original)

technical requirements particularly for wideband data and video applications in the 746-806 MHz band when no equipment exists with which to interoperate.

III. THE FCC SHOULD ADOPT MINIMAL TECHNICAL AND OPERATIONAL RULES FOR THE 746-806 MHz BAND THAT MAXIMIZES ITS EFFICIENT AND EFFECTIVE USE BY PUBLIC SAFETY USERS

The allocation of 24 MHz for public safety represents a significant increase in the amount of spectrum available for that purpose.²⁷ Appropriately, the FCC requests comment on the numerous technical and operational policies that are necessary to maximize the efficient use of this band.²⁸ Specifically, the FCC seeks comment on the role of regional planning committees in assigning channels to specific public safety agencies, the eligibility and use restrictions of this public safety band, and technical and operational standards for public safety technology.

Attached as Appendix A to these comments is a technical report detailing Motorola's recommendations for spectrum utilization of this band which addresses many of the technical issues raised in the *Second NPRM*. In summary, Motorola recommends that the following be adopted for public safety use of the spectrum allocated for public safety services.

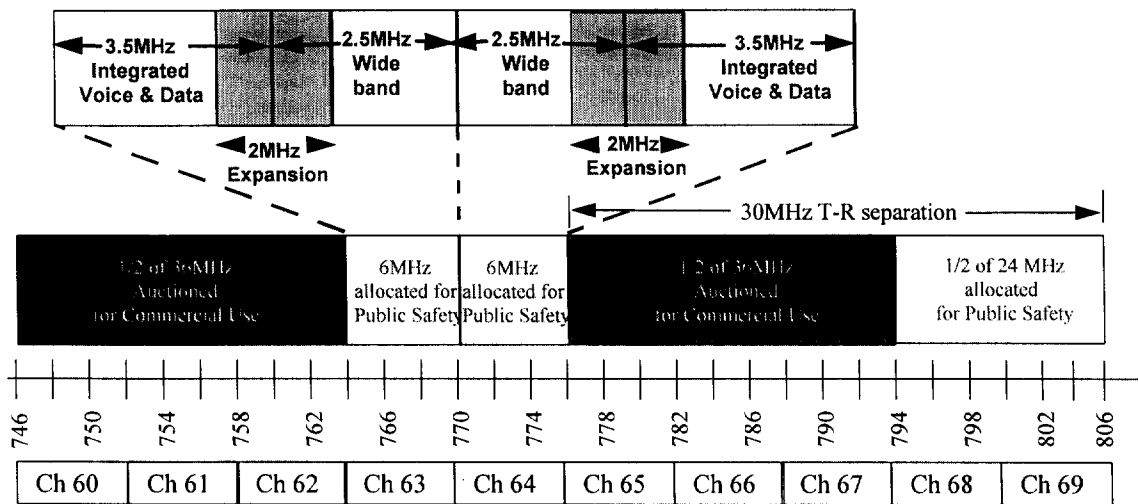
- Pair the 764-776 MHz sub-band (TV channels 63 & 64) with 794-806 MHz (TV channels 68 & 69)²⁹

²⁷ Of course, the actual utility of this allocation is restricted by the continued need to protect analog and digital broadcast television stations for the foreseeable future.

²⁸ *Second NPRM* at ¶108.

²⁹ While Motorola supports this standard pairing, the regional planning committees should be given the flexibility to recommend assignments based on non-standard channel pairing (*i.e.*, allowing paired use of frequencies in channels 63 and 69 or channel 64 and 68) to improve spectrum availability during the DTV transition.

- Designate 764-776 MHz for base and mobile station transmissions and 794-806 MHz for mobile station transmissions only in order to:
 - minimize interference among public safety users
 - maximize spectrum availability during shared environment
 - minimize potential interference to existing 806 MHz operations
 - maximize interoperability with current 806-824/851-869 MHz systems
- Within each 12 MHz block identified above, designate 7 MHz for integrated voice/data operations and 5 MHz for wide band operations such as imaging and video:



- Adopt channel building block increments of 6.25 kHz within the integrated voice data segment and 100 kHz building blocks within the wide band segment. Routinely allow aggregation of blocks on a frequency coordinated basis as needs dictate in order to accommodate multiple technologies and multiple users' needs.
- Base co-channel coordination on the "40 dBu + 3 miles" service contour standard and 5 dBu interference contour as used in the 821-824 MHz band for public safety.
- Adopt the following power limits:
 - Base stations: specific limit defined through frequency coordination and sharing criteria
 - Mobiles: 30 watts average transmitter output power (per slot for TDMA)
 - Portables: 3 watts average transmitter output power (per slot for TDMA)
 - Automatic Power Control (APC) should be required for mobiles/portables³⁰

³⁰ Automatic power control is a system process that adjusts the output power of mobile and
(Continued...)

- Adopt the following frequency stability requirements:
 - Integrated voice/data base stations: 100 parts per billion (ppb)
 - Wide band base stations: 1 part per million (ppm)
 - Integrated Voice/data mobiles/portables: Approximately 0.4 ppm by AFC locking to base station, with intermittent degradation to 2.5 ppm allowed if lock is lost.
 - Wide band mobiles/portables: Approximately 1.25 ppm by AFC locking to base station, with intermittent degradation to 5 ppm allowed if lock is lost.
- Recommend limits on couple power between public safety transmitters/receivers to be used with the 746-806 MHz allocations (*see* Appendix A, sections 2.4 and 3.2).
- Recommend the following limits on Coupled Power into public safety band segments from commercial operations to avoid interference:
 - Maximum of -75 dBm in a 6.25 kHz bandwidth from a commercial mobile/portable into PS mobile receive band
 - Maximum of -51 dBm in a 6.25 kHz from a commercial mobile station into PS fixed receive band
 - Maximum of -41 dBm in a 6.25 kHz from a commercial base/fixed station into PS mobile station receive band

The attached appendix offers in-depth analysis of these technical issues and provides extensive proposals for interference measurement techniques and frequency coordination procedures.³¹ These recommendations were made in large part based on Motorola's participation in the PSWAC process and reflect our best understanding of the needs of the public safety

(...Continued)

portable units based on their distance to the fixed base station receivers in order to maintain minimum levels necessary for effective communications.

³¹ It is highlighted that the interference specifications recommended by Motorola are based on the industry-preferred concept of "coupled power" rather than the historical use of emission mask requirements. This same concept was employed by the industry-developed protocols for station assignments in the private land mobile refarming bands as described in the recommendations of TIA's WG8.8 committee report now in process as TIA Telecommunications Service Bulletin TSB-77.

community. They are intended to foster flexible policies that are technology neutral and do not favor the deployment of any particular proprietary technology or product.

Motorola believes that the success of this or any other plan to utilize the 746-806 MHz is contingent upon an effective regional coordination process similar to that utilized in the 821-824/866-869 MHz band. In Motorola's opinion, the model developed by the NPSPAC committee strikes an appropriate balance between Federal and local oversight of public safety spectrum. Motorola recommends that the FCC avail itself to the benefits offered by the existing regional coordinating committees and utilize the existing structure to oversee the licensing and use of the new 746-806 MHz. The existing regional committees are in the best position to determine the needs of public safety agencies and users whose spectrum needs remain unsatisfied even after the most recent 800 MHz allocation.

In that regard, Motorola recommends that the FCC defer establishing rigid standards for determining the eligibility of specific agencies and users to access this new public safety band and instead defer any interpretations to the regional committees. While Congress intended that this allocation be available for organizations whose primary mission is the protection of life, health and property, there are numerous organizations that operate directly or indirectly in support of such missions. The appropriateness of such organizations to use this spectrum may vary across the country. Rather than establish a Federal interpretation of Congressional intent, Motorola supports leaving these decisions to the regional committees who are better able to determine the need for potential users to communicate with police, fire and emergency rescue crews.

Motorola supports the development of shared federal, state, and local systems that serve to ensure that a broad array of public safety/public service communications needs are met in a spectrum efficient manner and gives critical public safety entities access to a greater amount of spectrum in times of crisis. To the extent that some public safety organizations are discouraged by Federal fiat from accessing this band, additional allocations would be necessary in nearby bands to facilitate such shared systems.

Finally, Motorola notes that the *Second NPRM* addresses a potential interference situation caused by the second harmonic of public safety transmissions on channels 68 and 69 to aircraft receivers operating on the Global Orbital Navigation Satellite System (GLONASS). The FCC is seeking comment on this issue particularly from GLONASS users on their perception of the interference potential. Motorola welcomes this dialog and looks forward to reviewing the comments of the aeronautical community. To date, there has been little, if any, communication between GLONASS users and the public safety community (including manufacturers) discussing the joint needs of both user groups. Motorola needs to better understand the need for the level of protection demanded by aviation users of the GLONASS system before it can comment on its ability to achieve such levels with terrestrial public safety equipment.

IV. THE TV SHARING CRITERIA ADOPTED FOR 746-806 MHz SHOULD PROVIDE EXISTING USERS REASONABLE PROTECTION WHILE FACILITATING LAND MOBILE USE OF THE BAND

The availability of the 746-806 MHz band for public safety use will be constrained by the continued existence of broadcast television stations in channels 60-69 until the year 2006 and perhaps longer.³² In many markets, the utility of this band will be directly dependent upon the

³² Under the *Balanced Budget Act of 1997*, broadcasters can request extensions of the December
(Continued...)

availability of flexible assignment policies that allow public safety land mobile systems to locate closer to television stations than what would be typically allowed under existing rules applicable for shared use of the 470-512 MHz band.³³ Of course, these flexible assignment standards must ensure that broadcast television service is not degraded under real world receiving conditions.

Noting that the FCC has already characterized the existing sharing criteria for television and land mobile systems as “too conservative”, the *Second NPRM* discusses a variety of approaches and criteria for protecting TV broadcasting from the services that will occupy Channels 60-69.³⁴ Primarily, the FCC focuses on an approach that would protect co-channel analog TV stations on channels 60-69 during the DTV transition period by adopting geographical spacing requirements based on a 40 dB D/U signal ratio at the 55-mile Grade B contour of the protected TV station.³⁵ Adjacent channel TV operations would be protected by adopting geographical spacing requirements based on a 0 dB D/U signal ratio. As noted in the *Second*

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31, 2006 DTV transition deadline and continue to operate over both of their six megahertz channels if 1) in the particular market, one or more of the television stations licensed to or affiliated with the four largest national television networks are not broadcasting a digital television signal, or 2) digital to analog converter technology is not generally available in the market, or 3) at least 15 percent of the television households in the market do not subscribe to a multichannel video programming distributor that carries one or more of the digital television service programming channels of each of the television stations broadcasting such a channel in such market or do not have a television set capable of receiving the digital television signals of local broadcast stations. It is probable that these extensions will be more necessary in smaller rural markets.

³³ See 47 C.F.R. §90.301 *et seq.*

³⁴ *Second NPRM* at ¶231.

³⁵ *Id.* at ¶233.

NPRM, these standards were used in allocating additional UHF-TV spectrum to public safety agencies in the New York metropolitan area.

In discussing this approach, the FCC indicated that it would implement this policy through the development of a table permitting operation at distances based on particular powers and antenna heights of the land mobile stations. Recognizing that tables based on average operating parameters may be unduly restrictive, the *Second NPRM* seeks comment on whether additional levels of flexibility can be incorporated to take into account special engineering techniques such as directional or down-tilt antennas as well as the greater attenuation of signals at 746 MHz *vis a vis* 470 MHz. Finally, the FCC notes that the protection levels proposed above are based on analog TV service and that digital TV systems may be more immune to interference and thus require a lesser amount of protection from co-channel and adjacent channel land mobile and fixed stations. The FCC seeks comment on the appropriate D/U ratios that should be applied for the protection of DTV stations.

Section 5 of the attached appendix details Motorola's technical recommendations for land mobile shared use of the 746-806 MHz band. In general, Motorola provides technical support for its belief that the existing assignment criteria developed for land mobile sharing of the 470-512 MHz band is overly conservative and must be refined to maximize the benefits to the public safety community. More specifically, Motorola offers the following recommendations:

- The FCC should provide 40 dB protection to the TV station's Grade B contour as proposed in the *Second NPRM*.
- Frequencies in the 746-806 MHz band exhibit 5.3 dB greater propagation path loss than those in the 470-512 MHz band which should be considered to reduce the required spacing between land mobile systems and TV stations.
- Consistent with the methodology used to develop sharing criteria at 470-512 MHz, the performance characteristics of television receive antennas (front to back

ratios) provides at least 15 dB protection from land mobile transmission in the rearward direction.

- Thus, the use of the 40 dB protection ratio, with the appropriate reduction of $5.3 + 15 = 20.3$ dB will allow for successful sharing. The analysis includes additional assumptions that provide greater protection to broadcast stations than truly required such as assuming that all mobile and control stations are operating at a height of 100 feet above average terrain and ignoring cross-polarization discrimination characteristics of television receive antennas (which provides an additional 10 to 20 dB protection).

Motorola supports the FCC's suggestions that greater utilization of the spectrum can be achieved by public safety users due to the operational characteristics of the 746-806 MHz band. Motorola agrees with the FCC's preliminary views on the benefits of using a table that provides required separation distances to TV transmitters based on the land mobile station's operating parameters (*i.e.*, antenna height and power).³⁶ As described in Section 5.4.1 of the attached appendix, Motorola's analysis routinely would allow land mobile base stations to locate within 90 miles of a protected NTSC UHF television station.³⁷ Separations less than 90 miles can also

³⁶ The use of a table should simplify the first level of analysis for public safety users and commercial wireless providers. However, refined engineering methods may require greater flexibility to permit assignments that would violate the required spacings of the table. For example, certain frequencies within the 6 MHz video channel may require less protection than others and permit reduced spacings. Also, intervening terrain may provide a natural buffer to interfering signals. The deployment of land mobile stations based on such analyses should be permitted by rule, not waiver, while allowing for coordination between public safety entities (or their representatives) and the potentially affected broadcast station(s).

³⁷ Motorola notes that the *Second NPRM* seeks comment on the appropriate protection levels for DTV service given that digital signals should be more resilient to co-channel interference. While tests have been conducted that demonstrate that DTV only requires 10-13 dB carrier to interference protection, rather than the 40 dB required for analog stations, Motorola believes that it would be prudent at this time to offer the same level of protection to digital stations as that afforded analog given the developmental status of DTV service. Motorola recommends, however, that the FCC monitor this issue, maintaining flexibility during the transition period to ensure that DTV allotments do not unduly restrict use of the 24 MHz for public safety as directed by the *Balanced Budget Act of 1997*.

be achieved with appropriate reductions in antenna height or operating power as shown in the above-referenced table.

The deployment of land mobile stations on channels adjacent to television stations also benefits from the 20.3 dB propagation adjustment. In applying this factor to the existing adjacent channel table currently codified at Section 90.309 (Table E), the full 1000 watts would be permitted to land mobile stations operating as close as 59 miles from the TV transmitter.

Motorola believes that it is critical to the success of the public safety reallocation for the FCC to maximize land mobile deployment opportunities. Maintaining the existing protection criteria implemented for the 470-512 MHz band decades ago will significantly reduce the amount of spectrum available for public safety use. Motorola has analyzed the FCC DTV allotment plan as it pertains to channels 60-69. Should the FCC maintain the existing protection criteria, only 17 of the top 50 markets would have available at least one of the two 6 MHz channel pairs for public safety.³⁸ This number improves to about 30 markets if the methodology proposed herein is adopted. Given the public interest benefits of providing additional public safety spectrum, the FCC should adopt these policies especially considering that interference protection to broadcast stations is maintained.

V. THE UTILITY OF COMMERCIAL SYSTEMS FOR PUBLIC SAFETY USERS WOULD BE ENHANCED THROUGH REGULATIONS CLARIFYING CARRIER'S ABILITY TO OFFER PRIORITY ACCESS SERVICES

In addition to proposing to allocate spectrum at 746-806 MHz for public safety users, the *Second NPRM* also proposes to implement the suggestion of PSWAC to follow through on the

³⁸ Assuming, as recommended by Motorola, that the channel pairs available for public safety use are 63/68 and 64/69.

priority access petition previously filed by the Department of Defense.³⁹ Motorola believes that, while commercial systems, even with priority access, will never be a substitute for dedicated public safety radio networks, encouraging commercial mobile radio service (“CMRS”) providers to implement priority access will significantly enhance their ability to serve public safety users. At the same time, Motorola urges the Commission not to allow priority access issues to delay the more critical allocation of dedicated public safety spectrum at 746-806 MHz.

As the Commission recognizes, the ability of CMRS providers to tailor their offerings to meet the needs of public safety users is arguably constrained by the limitations of Section 202 of the Communications Act.⁴⁰ In particular, if a CMRS provider were to offer a public safety user priority access, a non-public safety subscriber could argue that it should be entitled to the same terms and conditions for priority access, thus defeating the ability of the carrier to meet emergency needs. In addition, a CMRS carrier could arguably also be subject to liability, either through civil suits or the Commission’s own forfeiture policies, were the carrier unable to complete a non-public safety subscriber’s call due to priority access loading. Motorola thus believes that the willingness of carriers to provide priority access would be substantially enhanced if the Commission would clearly state that differentiating between public safety and non-public safety users is not “unjust or unreasonable” discrimination under the Communications Act and would adopt rules exempting carriers from liability due to implementation of priority access for public safety users.

³⁹ See *PSWAC Report* at 317; Petition for Rulemaking of the Department of Defense, National Communications System (filed Oct. 19, 1995) (“NCS Petition”).

⁴⁰ *Second NPRM* at ¶¶196-197.